February 11, 2005

DECLARATION

The undersigned, Jan McLin Clayberg, having an office at 5316 Little Falls Road, Arlington, VA 22207-1522, hereby states that she is well acquainted with both the English and German languages and that the attached is a true translation to the best of her knowledge and ability of international patent application PCT/EP 03/05348 of Anthes, P., et al., entitled "POWER SUPPLY INDEPENDENT DEVICE FOR PRODUCING A HOT AIR FLOW".

The undersigned further declares that the above statement is true; and further, that this statement was made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or document or any patent resulting therefrom.

Jan McLin Clayberg

POWER SUPPLY INDEPENDENT DEVICE FOR PRODUCING A HOT AIR FLOW

The invention relates to a device as generically defined by the preamble to claim 1.

One such device is known from US Patent 5,857,262, for instance, which as the device describes a hot air dryer for drying hair. The hot air is generated by a catalytic heating element, which is supplied with a liquid fuel; the flow of hot air is generated by an electric blower, which is supplied by a rechargeable battery. One disadvantage of this is that for operating the device, not only must liquid fuel be replenished, but the battery must be recharged repeatedly externally, via a power supply unit, which in practice makes the device inconvenient to manipulate. For operating the hot air dryer, not only must the fuel reservoir be adequately filled, but the battery must be sufficiently charged.

The object of the invention is to create a device of this same generic type which makes it unnecessary to recharge a battery for operating the device and thus makes the device easier to manipulate.

This object is attained by the definitive characteristics of claim 1. Further advantageous refinements of the invention are defined by the dependent claims.

The invention will be described in further detail in terms of an exemplary embodiment.

Fig. 1, in a schematic side view, shows a hot air dryer as the device; and

Fig. 2 shows a block circuit diagram to illustrate the function of the hot air dryer.

In Fig. 1, as a power supply independent device 1 for generating a hot air flow 2, a hot air dryer 3 for drying hair is shown; heat 4 is generated by a catalytic heating element 5, which is supplied by a gas of a liquid fuel 6. A stream 14 of the hot air 2 is generated by an electric blower 7, which aspirates ambient air 15. The device 1 is provided with a fuel cell 8, which supplies the blower 7 with electrical energy 9 via a line 19. A fuel reservoir 10 for the liquid fuel 6 is provided, which communicates with the fuel cell 8 via a line 20, a valve 11, and a line 21, and with the heating element 5 via the valve 11 and a line 22, for the sake of supplying them jointly with the fuel 6 from the fuel reservoir 10. For ongoing operation of the device 1, only one operating fuel is needed. Pressing on an actuating device 18 opens the valve 11, and as a result the fuel cell 8 immediately furnishes electrical energy 9 to the blower 7 and supplies the heating element 5 with fuel 6. As a result, the valve 11 acts like an electrical on/off switch. Besides supplying the blower 7, the fuel cell 8 also supplies an electronic control unit 12, and selectively still other electric components 13 of the device 1 with electrical energy 9. A filling valve 16 is used for replenishing the fuel reservoir 10 with liquid fuel 6. For monitoring the level of liquid fuel 6, a viewing port 17 is provided, and at least in the region of the viewing port 17, the fuel reservoir 10 is of transparent material 18. A handle 23 is used for grasping the hot air dryer 3 and also serves to hold the fuel reservoir 10, fuel cell 8, and valve 11. As further exemplary embodiments of a device 1, a curling iron or a space heater, not shown, may be contemplated.

The PEMFC fuel cell (Polymer Electrolyte Membrane Fuel Cell) is technologically mature at present; it is operated with a solid, thin, gas-tight, proton-

conducting plastic membrane as its electrolyte. Hydrogen serves as the fuel 6. The output presently available is on the order of magnitude of power densities of approximately 1 W/cm^2. The weight per unit of power is approximately 2 kg/kW.

Since pure hydrogen, however, can be produced only by complicated reforming, there are worldwide efforts to find a way to use other anode gases. Promising candidates include the SOFC fuel cell 8 (Solid Oxide Fuel Cell). It enables a direct use of methane as an anode gas. The DMFC fuel cell 8 (Direct Methanol Fuel Cell) is a further starting point, which can be operated directly with methanol as the fuel 6, without reformation. These last two fuel cells 8, however, are at present still unsuitable for use in a portable hairstyling device.

The fuel reservoir 9 is filled with liquid hydrogen in the case of a PEMFC, with liquid methane in the case of an SOFC, and with liquid methanol in the case of a DMFC.

Although at present the PEMFC fuel cell is the sole possibility that can be employed immediately, this type of fuel cell is not limited to the invention. In the future, there will certainly be as yet unknown and improved forms of cells.

Fig. 2 shows a block circuit diagram for the function of the hot air dryer (hairdryer) of Fig. 1. By way of the valve 11 that can be switched by hand, the gaseous fuel 6 is supplied from the refillable fuel reservoir 10, which may for instance be embodied as a metal hydride reservoir, simultaneously to the catalytic heating element 5 and the fuel cell 8. As a result, heat 4 occurs in the heating element 5, and electrical energy 9 occurs in the fuel cell 8, for operating the electric blower 7, the electronic control unit 12 for the blower 7, and other electric components 13 of the device 1. The air stream 14 of the blower 7 is carried

through the heating element 5, thereby converting the heat 4 into a hot air flow 2 (Fig. 1).

List of Reference Numerals:

1 Device
2 Hot air flow
3 Hot air dryer
4 Heat
5 Catalytic heating element
6 Liquid fuel
7 Electric blower
8 Fuel cell
9 Electrical energy
10 Fuel reservoir
11 Valve
12 Electronic control unit
13 Electric component
14 Air stream
15 Ambient air
16 Filling valve
17 Viewing port
18 Actuating device
19 Line
20 Line
21 Line
22 Line
23 Handle